

5D BIM



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The **5D BIM** of plants and equipment.
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Abstract

Usage of Building Information Modeling is gradually spreading and encroaching more into the construction system with only a few aware of the possibilities and advantages involved in its use. This is a research paper on the use of BIM for the costing of plants and equipment's in the construction industry. It covers and assesses the challenges and advantages involved in the use of BIM for costing plant and equipment in the construction sector.

It is meant solely for academic and research purposes only. All referenced items are appropriately recognized at the reference page.

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INTRODUCTION

Meaning of BIM

Building information modeling (BIM) is a process involving the generation and management of digital representations of physical and functional characteristics of places. BIM software is used by individuals, businesses and government agencies that plan, design, construct, operate and maintain diverse physical infrastructures, such as water, wastewater, electricity, gas, refuse and communication utilities, roads, bridges and ports, houses, apartments, schools and shops, offices, factories, warehouses and prisons.

Building Information Modeling (BIM) represents the formation of digital models for use during the planning, design, construction and operation stages of a facility's life.

Advancement of BIM

Traditional building design was largely reliant upon two-dimensional technical drawings (plans, elevations, sections, etc.). Building information modeling (BIM) extends this beyond 3D, augmenting the three primary spatial dimensions (width, height and depth) with time and cost. BIM therefore covers more than just geometry. It also covers spatial relationships, light analysis, geographic information, and quantities and properties of building components

It all starts with 2D drawings, then we receive or make the 3D models and coordinate them; then we use the construction-caliber quantities from the takeoff for the 4D schedule and the 5D estimate.

5D BIM

Processes within estimating, such as quantity survey and pricing, may be automated by using existing BIM software in combination with existing estimating software.

The basic aim of the BIM is to combine 3D building models with scheduling data to produce 4D models in which the fourth dimension is time. The results may include

an animation of the construction execution as well as the scheduling data connected to the 3D model. Nevertheless, accurate estimation and planning of actual project costs are also very important for success in construction business.

Handling the project cost data by BIM approach give us an opportunity to manage the construction project costs more efficiently. As soon as the construction costs are identified and connected to the construction elements and scheduling data, the 5D building information model is created

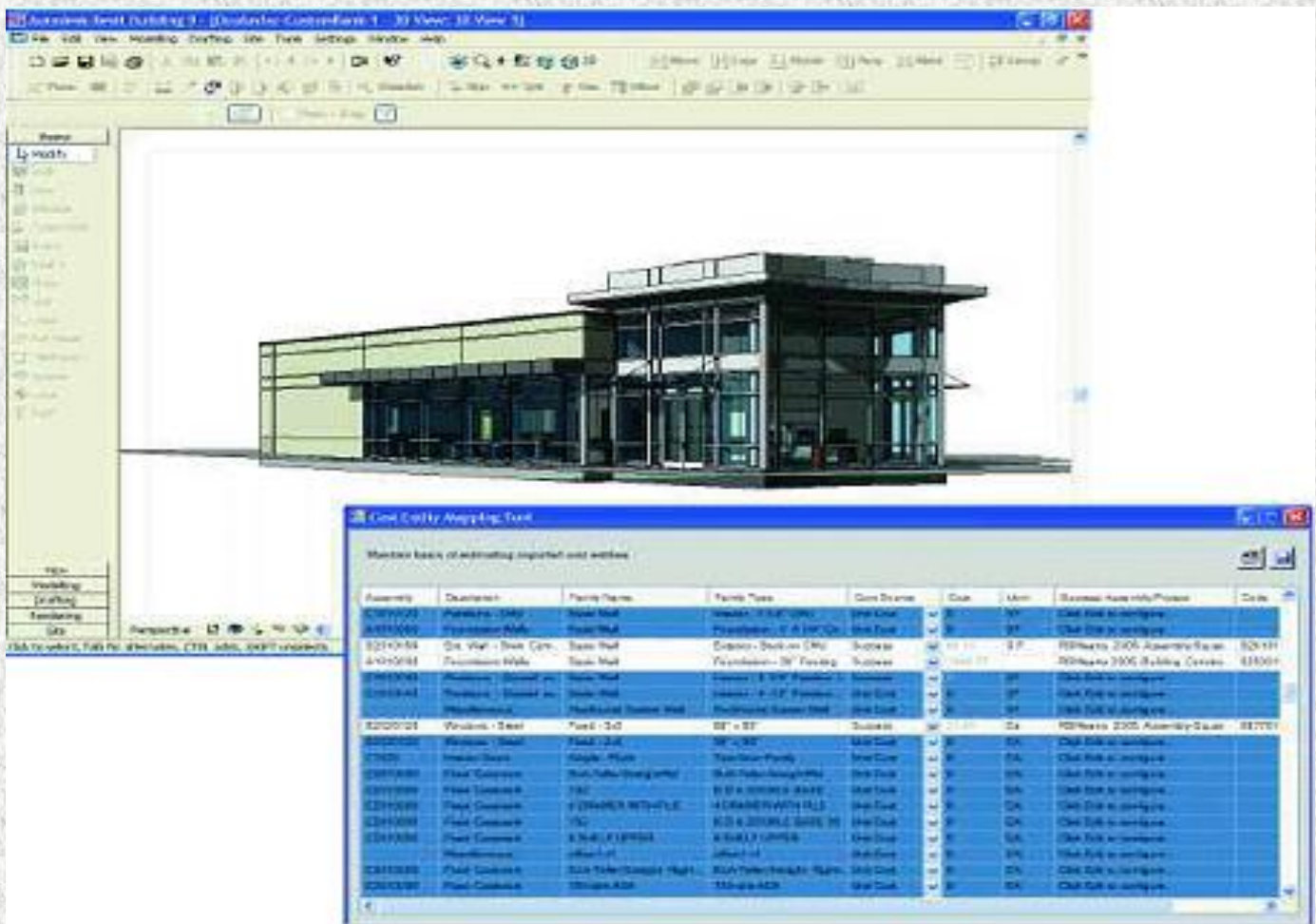


Image from Louise Sabol Challenges in Cost Estimating with Building Information Modeling

Methodology

The research topic is based on the conclusion that 5D BIM represents costing in the use of BIM. The paper is based on alternative and similar works on Building Information Modeling.

Information will be retrieved through different papers available online. To aid research, different academic textbooks will be consulted to broaden the scope of work.

The main data source used of this paper is documentary analysis which involves obtaining data from existing documents without having to question people through interviews, questionnaires or observe their behavior.

Use of 5D BIM for plants and equipment's

Cost estimating can be carried out through the 5D function, by linking the model to an estimating database (Haque and Mishra, 2007). Mena et al. (2010) discusses that this can be done through sources such as Building Cost Information Service (BCIS), to provide high level cost information, which will be useful in the early project stages. Certain software providers are now publicizing that it is possible to develop detailed cost plans through linking a '5D Cost Library' to BIM, which performs the function of an estimating database.

BIM software is compatible with estimating software, such as Innovaya Composer, which converts BIM files, making them compatible with Timberline's estimate and quantity data. Innovaya's Visual Estimating program links BIM data, consisting of doors, windows, and walls, etc., with Timberline's estimating data of labor costs, material costs, and equipment costs.

By compiling the quantity data in a single database, Timberline can assign costs, automating the estimating process. The estimator is saddled with the process of updating the cost database with current data to reflect the present market value of each item in the database



Image from Louise Sabol Challenges in Cost Estimating with Building Information Modeling

Advantages and Challenges of Using BIM

BIM enables automatic quantification (Deutsch, 2011) and the production of schedules (Woo, 2007), which will largely eliminate the need for manual take-off of buildings during estimating. In addition, design data is interrelated, and therefore an alteration of one element instantly updates anything affected by the change (Sylvester and Dietrich, 2010).

Through automatic quantification human error and inaccurate drawing interpretation during measurement will be eliminated. Hannon (2007) discusses that this will increase efficiency as it will avoid the time consuming and duplicate process of estimators quantifying what designers have already produced, reporting that manual quantification can take 50 – 80% of time during cost estimation. However, as Woo (Woo, 2007) points out, it will be essential that design information is correct in the first place because information extracted from the model is only ever as good as that inputted.

Through BIM's 3D viewer function, the facility can be viewed in an infinite number of ways, from any angle through the model (Sylvester and Dietrich, 2010). Improved visualization through this should be advantageous to clients, design teams and contractors in fully understanding a project's design (Haque and Mishra, 2007). Cost consultants should therefore have to make fewer assumptions, and as clients can clearly visualize the options available, it has proven to be a beneficial decision making tool, which is hoped will result in fewer revisions to cost plan. However, as Sabol (2008) reports, it is possible that too much model detail at early stages could confuse decision making and scenario planning.



Image from <http://www.bimhow.com/5d-bim-for-construction-companies/>

Conclusion

The use of Building Information Modeling (BIM) in the construction industry is on the rise. Whilst BIM is currently receiving high volumes of attention around the world, it appears that general understanding of it is relatively low.

5D in BIM is all set to bring a paradigm shift in the construction process by improving functionality and providing tools to estimate costs more accurately throughout the lifecycle of a project.

Recommendation

The massive use will effectively have a non-negligible difference in the costing of materials, plant and equipment's during construction. Construction firms should engage in its use for a better and effective output and its use should be wildly encouraged.

BIM Costing Applications:

Innovaya Visual Estimating [here](#)

Building Explorer [here](#)

U.S. Cost Success Design Exchange [here](#)

Trelligence Affinity[here](#)

Beck Dprofiler[here](#)

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